CLAIMS

What is claimed and desired to secure by Letters Patent is:

1. A power factor correction apparatus for power factor correcting an electrical installation including a power line having coupled thereto a load drawing AC electrical power including a potentially variable level of reactive power, said apparatus comprising:

(a) power sensor circuitry coupled to said power line and operative to detect an electrical parameter of electrical power drawn by said load which indicates a level of reactive power drawn by said load, said power sensor circuitry including a power measurement integrated circuit coupled to said power line;

(b) a plurality of reactance elements;

(c) switching circuitry controllable to couple said reactance elements to said power line individually or in selected combinations; and

(d) a controller interfaced to said power sensor circuitry and said switching circuitry and operative, in response to said level of reactive power indicated by said electrical parameter, to cause said switching circuitry to couple an appropriate combination of said reactance elements to said power line to thereby minimize said level of reactive power indicated by said electrical parameter.

2. An apparatus as set forth in Claim 1 wherein:

(a) said power measurement integrated circuit periodically determines a signed reactive power value from electrical power drawn by said load;

(b) said controller acquires said signed reactive power value from said power measurement integrated circuit; and

(c) said controller calculates said appropriate combination of said reactance elements from said signed reactive power value.

3. An apparatus as set forth in Claim 1 wherein:

(a) said power measurement integrated circuit periodically determines an active power value and an apparent power value from electrical power drawn by said load;

(b) said controller acquires said active power value and said apparent power value from said power measurement integrated circuit;

(c) said controller calculates a power factor value for said load from a ratio of said active power value to said apparent power value; and

(d) said controller calculates said appropriate combination of reactance elements from said power factor value.

4. An apparatus as set forth in Claim 1 wherein said reactance elements include:

(a) a plurality of capacitors.

5. An apparatus as set forth in Claim 1 wherein said reactance elements include:

(a) a set of capacitors of capacitance values varying in powers of two from a minimum capacitance value to a maximum capacitance value.

6. An apparatus as set forth in Claim 1 wherein said reactance elements include:

(a) a plurality of capacitors, each capacitor having a capacitance value which is a multiple of a base capacitance value; and

(b) said base capacitance value is that capacitance value which results in a reactance which draws substantially one ampere at a nominal line frequency and line voltage of said power line.

7. An apparatus as set forth in Claim 1 wherein:

(a) said controller includes a digital port formed by a specific plurality of port terminals;

(b) said switching circuitry includes latching elements which couple each of said reactance elements to specific ones of said port terminals; and

(c) said controller causes selected ones of said reactance elements to be coupled to said power line by writing to said port a multiple bit binary word having a bit content corresponding to said selected ones of said reactance elements.

8. An apparatus as set forth in Claim 1 wherein:

(a) said power sensor circuitry is coupled to said power line by being coupled to said load; and

(b) said power measurement integrated circuit and said controller are activated only in response to electrical activation of said load from said power line.

9. A method for power factor correcting an electrical power installation including a power line having coupled thereto a load drawing AC electrical power including a potentially variable level of reactive power, said method employing reactance elements and comprising the steps of:

(a) automatically measuring an electrical parameter of power drawn by said load using power sensor circuitry coupled to said power line, said power sensor circuitry including a power measurement integrated circuit, said electrical parameter being capable of indicating a level of reactive power drawn by said load; and

(b) automatically coupling an appropriate combination of said reactance elements to said power line to thereby substantially minimize said level of reactive power indicated by said electrical parameter.

10. A method as set forth in Claim 9 and including the steps of:

(a) said power measurement integrated circuit automatically measuring a signed reactive power value from electrical power drawn by said load;

(b) automatically obtaining said signed reactive power value from said power measurement integrated circuit; and

(c) automatically determining said appropriate combination of said reactance elements from said signed reactive power value.

11. A method as set forth in Claim 9 and including the steps of:

(a) said power measurement integrated circuit automatically measuring an active power value and an apparent power value from electrical power drawn by said load;

(b) automatically obtaining said active power value and said apparent power value for said load from said power measurement integrated circuit;

(c) automatically calculating a power factor value for said load from a ratio of said active power value to said apparent power value; and

(d) automatically determining said appropriate combination of reactance elements from said power factor value.

12. A method as set forth in Claim 9 wherein said coupling step includes the step of:

(a) coupling one or more of a set of capacitors to said power line as said appropriate combination of said reactance elements.

13. A method as set forth in Claim 9 wherein said coupling step includes the step of:

(a) providing a set of capacitors having capacitance values varying in powers of two from a minimum capacitance value to a maximum capacitance value; and

(b) coupling one or more of said set of said capacitors to said power line as said appropriate combination of said reactance elements.

14. A method as set forth in Claim 9 wherein said coupling step includes the step of:

(a) providing a set of capacitors to said power line, each capacitor having a capacitance value which is a multiple of a base capacitance value, and said base capacitance value being that capacitance value which results in a reactance which draws substantially one ampere at a selected nominal line frequency and a selected nominal line voltage of said power line; and

(b) coupling one or more of said set of said capacitors to said power line as said appropriate combination of said reactance elements.

15. A method as set forth in Claim 9 and including the steps of:

(a) providing a controller including a digital port formed by a specific plurality of port terminals and switching circuitry including latching elements which couple each of said capacitors to specific ones of said port terminals; and

(b) said controller effecting coupling of said appropriate combination of said capacitors to said power line by writing to said port a multiple bit binary word having a bit content corresponding to said appropriate combination of said capacitors.

16. A method as set forth in Claim 9 and including the step of:

(a) coupling said power sensor circuitry to said power line by way of said load; and

(b) activating said power sensor circuitry, including said power measurement integrated circuit, only in response to electrical activation of said load from said power line.

17. A method for power factor correcting an electrical power installation including a power line having coupled thereto a load drawing AC electrical power including a potentially variable level of reactive power, said method employing reactance elements and comprising the steps of:

(a) coupling a power measurement integrated circuit to said power line;

(b) automatically measuring a signed reactive power value from electrical power drawn by said load by said power measurement integrated circuit;

(c) automatically obtaining said signed reactive power value from said power measurement integrated circuit;

(d) automatically determining an appropriate combination of said reactance elements to thereby substantially minimize said level of reactive power indicated by said signed reactive power value; and

(e) automatically coupling said appropriate combination of said reactance elements to said power line to thereby power factor correct said power installation.

18. A method as set forth in Claim 17 wherein said coupling step includes the step of:

(a) coupling one or more of a set of capacitors to said power line as said appropriate combination of said reactance elements.

19. A method for power factor correcting an electrical power installation including a power line having coupled thereto a load drawing AC electrical power including a potentially variable level of reactive power, said method employing reactance elements and comprising the steps of:

(a) coupling a power measurement integrated circuit to said power line;

(b) automatically measuring an active power value and an apparent power value from electrical power drawn by said load by said power measurement integrated circuit;

(c) automatically obtaining said active power value and said apparent power value from said power measurement integrated circuit;

(d) automatically calculating a power factor value for said electrical power drawn by said load from a ratio of said active power value to said apparent power value;

(e) automatically determining an appropriate combination of said reactance elements to thereby substantially maximize said power factor value; and

(f) automatically coupling said appropriate combination of said reactance elements to said power line to thereby power factor correct said power installation.

20. A method as set forth in Claim 19 wherein said coupling step includes the step of:

(a) coupling one or more of a set of capacitors to said power line as said appropriate combination of said reactance elements.